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**Carson City Field Office  
Carson City, Nevada**

**August 2004**



**BLM Health and Safety Plan  
Process Area - Yerington Mine  
Yerington, Nevada**



**BLM HEALTH AND SAFETY PLAN**  
**PROCESS AREA - YERINGTON MINE**  
**YERINGTON, NEVADA**

August 14, 2004

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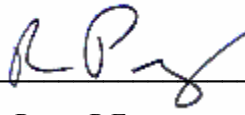
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# **1 INTRODUCTION**

The purpose of the Health and Safety Plan (HASP) is to identify health and safety risks associated with performing soil, surface water and groundwater sampling tasks at the Yerington Mine, Yerington, NV. This HASP was prepared using the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (USDHHSK, 1985). This HASP is in compliance with 29 CFR 1910.120 and 1910.1200, and was prepared for the exclusive use of the Bureau of Land Management Carson City Field Office (BLM) and its contractors and subcontractors. This HASP shall not be used for other than that described in BLM approved Work Plans, nor shall it be modified or used without written approval of BLM. In addition, this HASP shall not be used by firms or persons who are not under contract with BLM or their contractors. Work covered by this HASP will be conducted by the BLM's contractors, Walker & Associates Inc. (WAI), and CRE Inc. and its subcontractors. BLM personnel, and its contractors and subcontractors engaged in performance of activities at and near the site shall comply with all provisions of the HASP.

BLM, nor its contractor, can anticipate all the hazards inherent to the work activities of all its contractors and their subcontractors. Therefore, each contractor and subcontractor will be required to read and evaluate this HASP to insure that it adequately addresses the hazards presented to their employees. This HASP presents the minimum requirements for all contractors and subcontractors. Addenda may be attached to the plan to ensure that potential risks are controlled for all site tasks. In addition, no portion of this plan will be used without the expressed written consent of BLM.

## **1.1 Scope of HASP**

This HASP identifies the potential site hazards and outlines health and safety precautions to be followed during the soil, groundwater and surface water sampling activities planned to supplement existing site data. The investigative activities currently consist of the following:

- Surface soil sampling
- Ore and rock sampling
- Sampling groundwater monitoring wells
- Limited topographic and geophysical surveying

## 1.2 Project Organization

All field work including sampling and surveying will be performed by the BLM, CRE and WAI.

Key personnel are listed below:

Project Manager	Earle Dixon, BLM 775-885-6079 (office)
On-Site Project Manager	Ron Peery, P.E. (CRE) 406-656-1770 (office) 406-698-6465 (cell)
Site Safety Officer	William J. Walker, Ph.D. (WAI) 916-442-5304 (office) 916-716-1053 (cell)
Sampling and Surveying Assistance	Eric Mason, E.I.T. (CRE) Fred Mueller, P.E. (WAI)
Radiation Specialists	Rick Gunderson, P.E.(CRE) Digna Walker, ANP Occupational Medicine (WAI and UC Davis) Mark Shanker, MD UC Davis

The chain-of-command for health and safety issues will be reviewed with site workers each day before work starts.

## 1.3 Organizational Authority and Responsibilities

### 1.3.1 Project Manager

The Project Manager (PM), Mr. Earle Dixon (BLM), reports directly to the BLM Carson City Field Office, and will be responsible and accountable for all site project activities. The PM provides the following:

- Direction/supervision for WAI, CRE and their subcontractors site activities in accordance with BLM policies, this HASP, and project requirements;
- Compliance with local, state, and federal permitting requirements for field activities;
- Compliance with the project schedule and performance budget for environmental and technical support activities;

- Identification of scope, technical, quality, and safety and health issues;
- Authority to take actions to ensure that the staff are technically and professionally qualified, have adequate relevant experience, and represent sufficient resources to meet project health and safety objectives;
- Assign a Site Safety Officer (SSO) to the project, and if necessary, assign a suitably qualified replacement;
- Conduct or causing to conduct appropriate reviews to ensure that the HASP is properly implemented, and
- Implement corrective measures if and where appropriate.

### 1.3.2 On-Site Project Manager

The On-Site Project Manager (OSPM), Mr. Ron Peery (CRE), will report to the Project Manager on all aspects of the project, and coordinate all field activities. The OSPM provides the following:

- Coordination of field, waste management, safety and health, and field data management activities;
- Coordinating changes to the HASP with the SSO relating to specific work activities;
- Correcting work practices or conditions that may result in injury or exposure to hazardous substances;
- Coordinating with the PM and SSO on health and safety matters;
- Suspend field activities if the health and safety of personnel become endangered, and
- Suspend personnel or subcontractors from field activities for infractions of the health and safety plan, pending and evaluation by the PC.

### 1.3.3 Site Safety Officer

The Site Safety Officer (SSO), Dr. William J. Walker, is responsible for the on-site implementation of the Site Specific Health and Safety Plan. The SSO will monitor health and safety aspects of work activities and report to the PM or PC with any unusual conditions and concerns. The SSO will be responsible for the following:

- Direct health and safety related activities, such as daily “tailgate” meetings;
- Report all safety-related accidents or incidents immediately to the PC;
- Assist in all aspects of implementing the HASP;
- Maintaining health and safety equipment;
- Implementing emergency procedures as required;
- Evaluating the effectiveness of the HASP and reporting deficiencies as needed;
- Enforcing the “buddy system” to maintain communication between workers;
- Maintaining a health and safety log;
- Maintaining records of HASP compliance agreements for all staff and contractors;
- Defining limited access zones (based on potential hazards) on a task-by-task basis;
- Authority to suspend work or otherwise limit exposure to personnel if health and safety conditions appear to be unsuitable or inadequate, and
- Upgrade and downgrade levels of personal protective equipment (PPE) based on available data. (See section 2.8.6).

#### 1.3.4 Subcontractors

Subcontractors will be advised of the provisions of the project health and safety plan, of owner stipulations, and of contractual obligations. Subcontractors will also be advised of their obligation to comply with applicable statutory safety and health laws, regulations, and rules.

CRE and WAI will provide their personnel with proper safety training and instruction. Management of each subcontractor shall have a copy of this plan. A copy is to be kept with the subcontractor’s foreman while on site.

### 1.4 Project Health and Safety Requirements

BLM and its contractors, CRE and WAI, recognize that safety is an extremely important component of any successful project. BLM and CRE/WAI are committed to ensuring job safety, and expects all contractors to be equally committed to working safely. The health and safety requirements for this project will be as reasonable and practical as possible to allow contractors flexibility in performing their work. However, BLM and CRE/WAI will not

tolerate unsafe work practices. The minimum project health and safety requirements are defined in this HASP.

The SSO will observe the investigation activities and will perform routine inspections to ensure job safety. Specifically, the SSO will inspect for contractor compliance with Federal Occupational Safety and Health Act (OSHA) requirements, with accepted safe industry practices and standards, and with the requirements of this HASP.

All employers are required to notify their workers about workplace hazards from chemical substances and how to protect themselves. The requirements are explained in the Hazard Communication Standards (OSHA - 29 CFR 1910.1200 and 29 CFR 1926.59). These standards define the substances that are hazards; the information to be contained in Material Safety Data Sheets (MSDSs); labeling and warning requirements; and employee training requirements. "Hazardous" substances covered by these regulations that may be encountered during this project include, but are not limited to, metals, radionuclides, gasoline and fuel oils, solvents and cleaning chemicals, acids and other corrosive chemicals, adhesives, paints, coatings, welding rods, and compressed gases.

All contractors shall also comply with the following health and safety requirements:

- Comply with all applicable federal, state, local, and other applicable safety and health statutes, rules, ordinances, regulations, and requirements that apply to the contractor's scope of work. These include, but are not limited to, OSHA - 29 CFR 1910 (General Industry Standards), 29 CFR 1926 (Construction Industry Standards), 29 CFR 1910.120 (Hazardous Waste Operations), and 29 CFR 1910.1030 (Occupational Exposure to Bloodborne Pathogens Standard); CAL/ OSHA - 8 CCR Subchapter 4 (Construction Safety Orders) and 8 CCR 5192 (Hazardous Waste Operations); 8 CCR 3203 (Injury and Illness Prevention Program – see Table 1-1); and applicable industry standards (e.g., American National Standards Institute (ANSI)).
- Provide contractor with a written list of chemicals (including gases) to be brought on-site, and a MSDS for each. These are to be included in the contractor's HASP.
- Maintain at the site a file showing written documentation of employee training. This documentation can be as simple as an attendance list with a date and brief description of training topics covered, or copies of training certificates.
- All contractor site personnel and visitors with the contractor shall read, understand, and sign the contractor's approved HASP before entering any site work area. Those new to the site shall be given a site orientation and be escorted by someone familiar with the site and its hazards.
- Notify BLM and CRE/WAI immediately of any and all injuries or accidents. A written report shall be provided to CRE/WAI within 48 hours of the incident.

- Revise the Contractor's HASP if a change in scope or site conditions warrants (e.g., new hazards or need for different procedures, etc.). Provide a copy to BLM and CRE/WAI for review and approval.
- Deviations from the requirements or procedures listed in this HASP or the contractor's HASP may be justified under special circumstances. However, deviations from either HASP shall only be permitted with prior written approval from BLM and CRE/WAI.
- Comply with the following basic safety work rules:
  - Do not enter areas with posted signs indicating radiation hazard without proper PPE.
  - Do not work in new areas of the site without first clearing the area for radiation hazards.
  - All workers on-site must wear radiation dose badges, properly logged with control and background badges.
  - Operate and maintain tools and equipment according to manufacturer's instructions.
  - Use materials, tools, and equipment only for their intended purpose.
  - Hearing protection shall be worn in all high-noise areas or while performing high-noise tasks.
  - Proper gloves are required when handling material that cuts, burns, or contaminates the skin.
  - Good housekeeping shall be practiced at all times.
  - Clean up spills immediately and remove oily, flammable, or combustible waste/rags.
  - Access to safety and fire-fighting equipment shall be kept clear at all times. Learn how to use an extinguisher before you need it!
  - Gasoline-powered equipment shall not be refueled when running.
  - Secure all compressed gas cylinders in the upright position with caps on when not in use.
  - Never enter a Confined Space/excavation unless you have been trained for Confined Space Entry and until you get permission from your Safety Supervisor.

- Never enter an excavation more than 5 ft deep unless it is protected from cave-in, in accordance with 29 CFR 1926.650.
- Excavations shall be benched or ramped for access/egress or otherwise provided with a ladder.
- All electrical cords shall be of the three-wire type and protected by a Ground Fault Circuit Interrupter (GFI).
- Wire rope chokers, slings, chains, and come-a-longs are to be inspected before use.
- No worker, other than the operator, shall ride on trucks, loaders, shovels, or moving equipment unless authorized.
- Immediately report all near-misses, accidents, and injuries to your supervisor.
- Report unsafe conditions or practices to your supervisor.

The contractor's on-site Safety Supervisor shall have appropriate and relevant health and safety experience and shall be familiar with the methods, tools, and equipment to be employed by the contractor.

## **1.5 Notification of Local Agencies**

The risks to the community and the environment while developing this study are judged to be unknown. This HASP includes an Emergency Response/Contingency Plan for potential site emergency scenarios.

## 2 SITE HEALTH AND SAFETY HAZARD ANALYSIS

This section identifies potential health and safety hazards to workers.

### 2.1 Overview

The potential site hazards are grouped into the five categories listed below. An analysis of specific hazards is presented later in this section.

- Physical - These include injuries from using tools and mechanized equipment, slips/trips/falls, all other types of physical bodily injuries, and heat stress and cold stress.
- Physiochemical - These include physical bodily injuries resulting from chemicals (rather than toxic health effects from chemicals). These physical injuries result from fire, explosion, chemical burns, or asphyxiation. Chemicals under this category include solids, liquids, and gases that are combustible; flammable; explosive (including all compressed gases, even if chemically inert); unstable; water-reactive; air-reactive; and pyrophoric (ignite spontaneously in air at 130°F or below). Also included are oxidizers (substances that initiate or promote combustion in other materials) and organic peroxides. Corrosive substances are also included (they cause burns). Oxygen-rich and oxygen-deficient atmospheres are also included. Oxygen-rich atmospheres promote fire or explosion, while oxygen-deficient atmospheres can cause asphyxiation. Some gases and vapors, when present in high concentrations in air, act primarily as simple asphyxiants without other significant physiological effects. Some simple asphyxiants include acetylene, argon, ethane, ethylene, helium, hydrogen, methane, neon, propane, and propylene.
- Chemical - These include acute or chronic health effects from exposure to chemicals. Most chemical substances or products could potentially fall under this category. MSDSs should be consulted to identify specific health effects and how to protect employees.
- Biological - These include injuries and health effects resulting from contact with living plants, animals, bacteria, and viruses. Bites and stings from insects, animals, snakes, and reptiles are included. Ingestion of nuts, fruits, or leaves are included, as well as skin inflammation from contact with plants (e.g., poison ivy, oak, and sumac). Contact with sewage and other etiological (i.e., disease causing) agents are included. Especially significant are bloodborne pathogens, which include, but are not limited to, Hepatitis B virus (HBV) and the human immunodeficiency virus (HIV).

- **Radiation** - These include acute or chronic health effects from exposure to radiation. Ionizing radiation includes radionuclides from “radioactive” sources such as uranium, thorium, radium and radon. Nonionizing radiation sources include lasers (e.g., for surveying), microwaves, radio frequency waves, ultraviolet (UV) light, and infrared light. Sunburn from exposure to daylight is usually not considered a “radiation” hazard. If considered at all, it would be a physical hazard.

## **2.2 Physical Hazards**

Many of the hazards associated with this project will be physical hazards. Specific hazards are listed in Table 2-1. Many of these hazards are common to most sites and locations. Hazards specific to the Mine site and planned activities are discussed in the following paragraphs.

### **2.2.1 Confined Space**

Note that Confined Space Entry is a potentially life-threatening physical hazard which could be involved with some of the planned activities. A Confined Space is any space having a limited or restricted means of entry or exit, large enough and so configured that a worker can bodily enter and perform assigned activities; however, it is not designed for continuous occupancy. Confined Spaces can subject personnel to the accumulation of toxic or flammable/explosive contaminants, contain physical hazards, or have an oxygen-deficient atmosphere. Death can result from asphyxiation, toxic exposure, fire or explosion, drowning, electrocution, or injuries caused by energized mechanical equipment (e.g., mixing blades). Other injuries can include falls, burns, and engulfment.

Confined Spaces can include, but are not limited to, the following: storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, underground utility vaults, tunnels, pipelines, and open-top spaces more than 4 ft in depth (such as pits, tubs, vaults, and vessels). Specific examples of Confined Spaces at the Yerington Mine site include the Mega Pond vaults, copper cementation and separation faults, and various abandoned structures across the process area.

### **2.2.2 Open Pit**

Access to the open pit lake and the steep banks that surround it requires special precautions. Sampling of the pit water will be discussed if it becomes part of future investigations.

### **2.2.3 Drill Rigs**

The hazards associated with heavy equipment involve moving parts and exposure to possible pinch points. Safe operating procedures for each type of equipment or activity should be reviewed and followed. No loose hair will be allowed around rotating heavy equipment, and only qualified personnel will operate machinery. Hard hats and steel-toed boots shall be worn by all personnel operating or working within close proximity of heavy equipment. The

use of heavy equipment on the site is planned and there are many other activities going on simultaneously. Personnel must be aware of their surroundings at all times.

#### 2.2.4 Heat Stress

During summer months, the air temperature on the site may reach the 90s, increasing heat stress. Heat stress is intensified in the underground mine workings, with temperatures potentially exceeding 100° F in some areas. During the winter, outdoor temperatures may be below freezing, with ice and snow. Driving hazards are increased by poor visibility and slippery road surfaces. Also, the potential for frostbite and falls is increased. Standard Operating Procedures (SOPs) for recognizing, preventing, and treating Heat Stress and Cold Stress are contained in Appendix A. Contractors shall comply with these SOPs.

#### 2.2.5 Illumination

Site activities will be performed during daylight hours (½ hour after sunrise to ½ hour before sunset). Artificial illumination will be provided should night work become necessary.

#### 2.2.6 Inclement Weather

Drilling and sampling equipment will not be operated in periods of inclement weather where visibility, dampness or cold would endanger crews operating the equipment. The SSO will evaluate whether other sampling activities can be performed safely. No site work will be performed during thunder and lightning storms. Site personnel will stay clear of drill rigs and bodies of water and seek shelter during electrical storms. No work should be performed during periods of significant wind due to the potential for airborne, radioactive, alpha-emitting dust particles.

#### 2.2.7 Remote Work Areas

Work at the site will be performed in teams working in close proximity. Remote offsite work is not anticipated at this time.

#### 2.2.8 Rough Terrain

The mine site is characterized by steep slopes and rugged terrain. Care must be taken when working on steep slopes and along road edges. Employees must ensure they have sound footing at all times and do not descend down unstable slopes.

All site personnel will wear orange safety vests or other highly visible brightly colored clothing. In addition, excursions outside of the barren open area of the mine for sampling or reconnaissance will be performed using the buddy system.

#### 2.2.9 Traffic

Traffic in the work area will usually be limited to various rigs and their support trucks. Site traffic should be minor. When traveling on the site care must be maintained to check for obstructions and hazards, especially on mine haul roads with limited visibility.

#### 2.2.10 Working near water

No work will be performed in the fenced area of the pit lake without the knowledge and presence of the SSO.

### 2.3 Chemical Hazards

Sources at the Mine that present the potential for exposure to chemical hazards are:

1. Acidic Mine Drainage (AMD)
2. Seeps
3. Waste rock piles and tailings ponds
4. Heap ponds
5. Chemically uncharacterized waste piles, sludges and vault bottoms
6. Various disposal ponds in the process area

AMD is an acidic solution ( $H_2SO_4$ ) that contains dissolved metals (e.g. copper, zinc, uranium, cadmium, lead and other metals) and has low pH. The AMD is toxic if ingested, and direct contact can cause burns or possibly absorption of chemicals into the body. First aid for contact of either the skin or eyes with AMD consists of immediate and thorough rinsing of the affected area with water. A portable eye wash station will be located in the staging area west of and adjacent to the tailings piles.

Seeps or “springs” flow from hillsides (usually along stream banks) and also from some waste rock piles. Some of these seeps contain dissolved heavy metals and may be acidic. Seeps could be toxic if ingested, and direct contact may cause burns or possibly absorption of chemicals. For these reasons, seep or spring water found on-site shall not be used for drinking, washing, rinsing, etc.

Waste rock piles (i.e., tailings or mining spoils) are piles of discarded rock and soils that consist of either overburden rock and soils removed to access the mineral deposits; or milled rock and minerals that were discarded after the recoverable minerals were removed. This waste rock may contain residual minerals, including heavy metals. Airborne dusts generated by disturbing waste rock piles could potentially pose an inhalation hazard, and workers will

be protected (e.g., by dust control measures, minimizing disturbance, or respiratory protection equipment) if investigative activities require their disturbance.

Work that could cause workers to come into contact with AMD is classified as “hazardous waste site work” (as defined by OSHA). Workers performing hazardous waste work must meet the training and medical examination requirements of 29 CFR 1910.120 (OSHA).

## **2.4 Biological Hazards**

Potential biological hazards are listed in Table 2-1.

Animal and bird droppings can accumulate in soils near nesting or roosting places. These droppings often contain mold, fungus, or bacteria that pose significant respiratory system hazards, including lung diseases and allergies. Two specific lung diseases, spread when contaminated soils are disturbed and inhaled, are Histoplasmosis and Coccidiomycosis. Both produce flu-like symptoms (and possible serious long-term effects) and can be confirmed with a blood test and chest X-ray.

Animal bites or stings are usually nuisances (localized swelling, itching, and minor pain) that can be handled by first aid treatments. The bites of certain snakes, lizards, spiders, and scorpions contain sufficient poison to warrant medical attention. Rattlesnakes are present and have been observed on the site. Do not touch spiders or snakes if they are discovered. If bitten, the injury site should be iced pending paramedic arrival or transport to an emergency treatment facility in Yerington. There are diseases that can be transmitted by insect and animal bites. Examples are Rocky Mountain spotted fever and Lyme disease (ticks); rabies (mainly dogs, skunks, and foxes); and malaria and equine encephalitis (mosquitoes). The greatest hazard and most common cause of fatalities from animal bites, particularly bees, wasps, and spiders, are from a sensitivity reaction. Anaphylactic shock due to stings can lead to severe reactions in the circulatory, respiratory, and central nervous systems, which also can result in death. Anyone assigned to the project that is allergic will be required to carry a prescribed treatment kit, and first aid personnel are to be told who is allergic. All stings or bites will be taken seriously. Anyone stung or bitten will be required to stop work while that person is observed for signs of severe swelling, shortness of breath, nausea, or shock. If there is any doubt, medical attention will be obtained.

The most dangerous toxic effects from plants are caused by the ingestion of nuts, fruits, or leaves. Consequently, personnel are prohibited from eating any fruits, nuts, or other plant material that grows on the site. More frequent but less dangerous hazards to site personnel are certain plants, including poison ivy, poison oak, and poison sumac that produce adverse effects from direct contact. The usual effect is dermatitis (inflammation of the skin). Thoroughly cleaning the skin with soap and water after contact will reduce effects. Sleeves and gloves should be worn by sensitive individuals.

Bloodborne pathogens are pathogenic microorganisms that may be present in human blood (and other body fluids) and can cause disease in humans. These pathogens include, but are not limited to, HBV and HIV.

OSHA requires compliance with 29 CFR 1910.1030, Occupational Exposure to Bloodborne Pathogens Standard, where as a condition of employment, there is known or potential exposure to bloodborne pathogens. A source of occupational exposure may occur when an employee gives first aid or cardiopulmonary resuscitation (CPR) to an individual who has infectious blood. The occupational exposure occurs when potentially infectious materials come in contact with the employee's eyes, mucous membranes, or non-intact skin through cuts and abrasions while administering first aid or CPR. Additional sources of exposure are contact with glassware, needles, sharp objects, or other materials that have been involved in injuries to personnel resulting in contamination with blood or related body fluids.

## **2.5 Radiation Hazards**

### **2.5.1 Types of Ionizing Radiation**

Prior to discussing radiation hazards at the Yerington Mine site, it is useful to review the definition of radiation hazards. There are three main kinds of ionizing radiation:

- Alpha particles, which include two protons and two neutrons
- Beta particle, which are essentially electrons
- Gamma rays and x-rays, which are pure energy (photons)

A description of these types of radiation, as summarized by the EPA on its website ([www.epa.gov/radiation](http://www.epa.gov/radiation)), follows below.

#### *2.5.1.1 Alpha particles*

Most alpha emitters occur naturally in the environment. For example, alpha particles are given off by uranium-238, radium-226 and other members of the uranium decay series. Alpha particles don't get very far in the environment. Once emitted, they travel relatively slowly (at approximately one-twentieth the speed of light) due to their electric charge and large mass.

The health effects of alpha particles depend heavily upon how exposure takes place. External exposure (external to the body) is of far less concern than internal exposure, because alpha particles lack the energy to penetrate the outer layer of dead skin. However, if alpha emitters have been inhaled, ingested (swallowed) or absorbed into the blood stream sensitive living tissue can be exposed to alpha radiation. The resulting biological damage increases the risk of cancer; in particular, alpha radiation is known to cause lung cancer in humans when alpha emitters are inhaled. The greatest exposure to alpha radiation for

average citizens comes from the inhalation of radon and its decay products, several of which also emit potent alpha radiation.

#### *2.5.1.2 Beta particles*

Beta particles are subatomic particles ejected from the nucleus of some radioactive atoms. They are equivalent to electrons. Often, gamma ray emission accompanies the emission of a beta particle. Beta particles travel several feet in open air and are easily stopped by solid materials.

Beta radiation can cause both acute and chronic health effects. Acute exposures are uncommon. Contact with a strong beta source from an abandoned industrial instrument is the type of circumstance in which acute exposure could occur. Chronic effects are much more common. Chronic effects result from fairly low-level exposures over a long period of time. They develop relatively slowly (5 to 30 years for example). The main chronic health effect from radiation is cancer. When taken internally beta emitters can cause tissue damage and increase the risk of cancer. The risk of cancer increases with increasing dose.

#### *2.5.1.3 Gamma rays and x-rays*

A gamma ray is a packet of electromagnetic energy – a photon. Gamma photons are the most energetic photons in the electromagnetic spectrum. Gamma rays are emitted from the nucleus of some unstable (radioactive) atoms. Gamma radiation emission occurs when the nucleus of a radioactive atom has too much energy. It often follows the emission of a beta particle. Because of their high energy, gamma photons travel at the speed of light and can cover hundreds to thousands of meters in air before spending their energy. They can pass through many kinds of materials, including human tissue. Very dense materials, such as lead, are commonly used as shielding to slow or stop gamma photons.

Most people's primary source of gamma exposure is naturally occurring radionuclides, particularly potassium-40, which is found in soil and water, as well as meats and high potassium foods, such as bananas. Radium is also a source of gamma exposure. Most exposure to gamma and x-rays is direct external exposure. Most gamma and x-rays can easily travel several meters through air and penetrate several centimeters in tissue. Some have enough energy to pass through the body, exposing all organs.

Both direct (external) and internal exposures to gamma rays or x-rays are of concern. Gamma rays can travel much farther than alpha or beta particles and have enough energy to pass entirely through the body, potentially exposing all organs. A large portion of gamma radiation passes through the body without interacting with tissue – the body is mostly empty space at the atomic level and gamma rays are vanishing small in size. By contrast, alpha and beta particles inside the body lose all their energy by colliding with tissue and causing damage. X-rays behave in a similar way, but have slightly lower energy.

Because of the gamma ray's penetrating power and ability to travel great distances, it is considered the primary hazard to the general population during most radiological

emergencies. In fact, when the term “radiation sickness” is used to describe the effects of large exposure in short time periods, the most severe damage most certainly results from gamma radiation.

### 2.5.2 Radiation at the Yerington Mine Process Area

Recent surface (0-6”) soil sampling at the process area of the mine site (see original work plan in Appendix D and data results in Appendix E) has revealed high levels of gross alpha and beta radiation (up to 1,440 and 592 pico-curies per gram (pCi/g), respectively), high levels of radium (Ra) 228 and 226 (up to 139 and 157 pCi/g, respectively), and high concentrations of uranium (U) (up to 430 milligrams per kilogram (mg/kg)) and thorium (Th) (up to 1,350 mg/kg). Due to these levels, the site is considered a radiation risk area (see maps in Appendix E) and care must be taken to protect all on-site and off-site receptors. To date the full extent, including magnitude, of radiation hazard at the site has not been determined. However, the gross alpha radiation poses a significant threat due to potential dust inhalation. As a result, the following precautions will be taken until dose measurements and extent of aerial and subsurface radiation hazard have been determined.

For soil sampling, a basic radiological survey will be conducted in the process area. A Geiger Muller (GM) counter and dosimeter will be placed at each flagged location and the total counts per ten minutes recorded and compared to the background counts per minute (CPM) and millirems per hour (mR/hr). **Locations with CPM of 100 CPM above background will be noted. Background CPM may range up to 200 CPM, therefore CPM of 300 or more may be considered excess radioactivity. Counts approaching 2000 CPM (about 2mR/hr) will require a worker to leave that location, since it approaches the 5 Rem/yr (2mR/hr) safety standard. The basic OSHA safety standard of 5 Rem/yr will be followed at the site, which translates to 2.0 mRem/hr allowable exposure, assuming an 8 hr working period. Film badges will be worn by all personnel.** In addition, a film badge blank (used as a control on background conditions) will be left in a clean, offsite location (such as the workers’ lodging). In this way, whole body doses can be determined for the work period of the project. Film badges will be analyzed on a quarterly basis, at a minimum. All sample information will be entered in a notebook and then entered into a spread sheet. See Section 2.8 for more information on radiation protection and protocols.

## 2.6 Task-Specific Hazard Analysis

Potential hazards associated with discrete tasks will depend upon the methods, tools, equipment, and materials employed by the contractor, as well as the work location on-site. These hazards can be minimized and managed by employing safe work practices, which include the use of personal protective equipment (PPE), when appropriate. Minimum standards for personnel protection are described in Subsection 2.8. Contractors will develop task-specific hazard analysis for their work as referred to in Sections 2.7 and 2.8.

## **2.7 Personnel Protection and Decontamination – Non-Radiation Hazard Areas**

Personnel who are engaged in activities where they may be exposed to hazards must comply with the minimum required standards for the appropriate personnel protection for those hazards as described in Table 2-2. For work with chemical hazards, the minimum PPE and decontamination procedures are listed in Table 2-3.

## **2.8 Personnel Protection and Decontamination - Radiation Hazard Areas**

Exposure to potential chemical, radiological, and physical hazards will be mitigated by the use of engineering controls, administrative controls, or PPE to prevent exposures where possible, or minimize them where engineering controls are not feasible. All project personnel are responsible for understanding the hazard identification and mitigation measures necessary to prevent exposures.

### **2.8.1 Radiological Exposure Prevention: As Low as Reasonably Achievable Principles**

Radiation exposure of project personnel will be controlled such that radiation exposures are well below regulatory limits and that there is no radiation exposure without commensurate benefit. Unplanned and preventable exposures are considered unacceptable. All project tasks will be evaluated with the goal of eliminating or minimizing exposures. All project personnel have the responsibility for following as-low-as reasonably achievable (ALARA) principles and practices. Personnel working at the site must strive to keep both external and internal radiation doses ALARA by adopting the practices outlined below.

Basic protective measures used to reduce external doses include: (1) minimizing time in radiation areas, (2) maximizing the distance from known sources of radiation, and (3) using shielding whenever possible. These methods of minimizing external dose are described below.

#### ***2.8.1.1 Methods for Minimizing Time***

- Plan and discuss the tasks before entering a radiation area (including having all equipment and tools prepared).
- Perform as much work as possible outside radiation areas and take advantage of lower dose rate areas (as shown on the radiological survey maps).
- Take the most direct route to the tasks and work efficiently.
- If problems (such as engineering control failures, equipment or machinery malfunctions, personal injury or unexpected radiation exposure) occur in the radiation areas, hold technical discussions outside radiation areas, then return to the work area (if practical as determined by the SSO or the site industrial hygienist) to complete the task.

#### *2.8.1.2 Methods for Maximizing Distance from Sources of Radiation*

- Use remote operated equipment or controls where required.
- Stay as far away from the source of radiation as possible (extremely important for point sources where, in general, if the distance from the source is doubled, the dose rate falls to one-fourth of the original dose rate).
- Become familiar with the radiological survey map for the area in which work will be performed as well as high and low dose-rate locations, and take advantage of low dose-rate areas. A laminated site map indicating radiation hazard areas will be posted at the entry point to the site and at each radiation hazard area.

#### *2.8.1.3 Internal Radiation Dose Reduction*

An internal radiation dose potential exists at the Yerington Mine. An internal dose is a result of radioactive material being taken into the body. Radioactive material can enter the body through inhalation, ingestion, absorption through wounds, or injection from a puncture wound. Reducing the potential for radioactive material to enter the body is critical to avoid an internal dose. The following are methods to minimize internal radiation dose hazard:

- Know the potential and known contamination sources and locations, and minimize or avoid activities in those areas.
- Wear protective clothing and respiratory protection as identified below, perform all respirator leak checks, and inspect all PPE before entering contaminated areas or areas with airborne radioactivity.

#### *2.8.2 Personal Monitoring Equipment*

For radiation hazard areas, level C equipment (defined in Section 2.8.6.3) will be required for initial surface soil and groundwater sampling. For subsurface investigations, additional precautions will likely be required. These will be outlined and detailed after site survey work is complete. The necessary protocols and precautions for the known radiation hazards are outlined below.

- All on-site workers must wear radiation film dosimeter badges. The badges must be logged in and submitted for analysis after an appropriate exposure time period (most likely monthly or quarterly) to be determined by the SSO.
- **No contractors other than CRE/WAI will be allowed to conduct site investigations in radiation hazard zones until the nature and dose of radiation hazard has been determined.**
- No visitors will be allowed into designated radiation hazard zones.

- Each on-site worker will wear fitted, respiratory protection while working in the radiation hazard areas.
- Each worker will wear disposable coveralls and disposable rubber boots in the radiation hazard zones.
- Each worker will wear goggles securely fit over the face and eyes.
- Only select workers will be allowed to enter the radiation hazard zones. These zones will be fenced and clearly marked as radiation hazard areas. Workers cleared for entry will be notified of their total allowable time in each radiation hazard area.
- GM counters must be used to clear any area for potential radiation hazards prior to working in area.
- **The OSHA 5 rem/yr standard will be used as an initial radiation exposure guideline but will include the 10 fold safety factor of 0.5 mR/yr proposed by the Department of the Navy. This standard allows a safety factor in the event that a worker is unknowingly exposed to an unanticipated extreme level of radiation.**
- Based on personal dosimeter/badges, the dose of each worker will be determined and compared to allowable daily doses.
- The SSO shall determine which person(s) working in a radiation hazard area will wear a personal air sampler. The air sampling device is a lightweight, battery operated pump with an air collection/filtration device near the head of the worker. The air sampler will collect filtered particles from the air to be analyzed for radiation.
- No subsurface sampling will be done without wearing PPE level B equipment (defined in Section 2.8.6.2) within the elevated radiation areas noted in Appendix D. In addition, engineering controls must be used to prevent migration of dust from any of the noted radiation areas of the site.
- Appropriate exclusion zones, exclusion zones entry points and decontamination zones will be designated as described above once all radiation hazard areas have been identified.
- Smoking, eating, cell phone use, are all forbidden in identified radiation exclusion zones.
- Based on recent work conducted at the site, it is suggested that work be conducted during periods of stable atmospheric condition (i.e., little to no wind). Favorable conditions typically occur in the early mornings and evenings.

### 2.8.3 Sampling Protocols in Radiation Hazard Zones

- **Approach sampling location using a GM counter. If the counter remains below 300 CPM then sampling may proceed with Level D protection. If CPM >300 and <500, then a respirator and goggles must be worn. If CPM is >500, then full Level C or B protection must be worn. The PPE required at CPM>500 will be determined by the SSO after discussion with the radiation health specialist.**
- Walk to sample locations. Each worker will wear hardhats, goggles, disposable boots, gloves and coveralls, and respirators.
- Each worker will wear a film badge. All work will be conducted using the buddy system, therefore, one person in each team will use a GM counter to scan the area of interest, including the path to the sampling location.
- At the sampling location, the sample will be collected, CPM and dose measured, and the position flagged and entered into a GPS database.
- Workers will always work in pairs such that one person can keep track of dosing while the other person samples.
- After the sample is collected, the equipment will be decontaminated with Radiac wash and the disposal gloves and towels placed in heavy plastic disposal bags.
- After leaving the border of the sampling location, the workers will remove disposal protective clothing, and clean and scan equipment to ensure close-to-background levels are achieved (20% within 100 CPM).
- At the end of the work day, all waste (coveralls, disposable boots, cleaning cloths) will be left at the staging area and the vehicle washed and vacuumed before leaving the site.
  - An area for storage and disposal of radiation contaminated material will be designated prior to the start of site work.
  - Solid waste will be collected at the end of each day in an appropriate container and stored in the designated disposal area.
  - Liquids (such as rinsate, and decontamination fluid) will be collected in drums in the various work locations.
  - All waste will be classified and disposed of in accordance with federal regulations.

#### 2.8.4 Industrial Hygiene Area, Personal Monitoring and Instrument Calibration

The Project Industrial Hygienist (IH) will conduct full- and partial-period sampling of airborne contaminants and monitoring of physical agents at a frequency deemed appropriate based on direct-reading instrument readings and changing site conditions. All air sampling will be conducted using applicable National Institute of Occupational Safety and Health (NIOSH), OSHA, or other validated method. Both personal and area sampling and monitoring may be performed.

Various direct-reading instruments may be used to determine the presence of non-radiological and other physical agents. The frequency and type of sampling and monitoring will be determined by changing site conditions, direct-reading instrument results, observation, and professional judgment

All monitoring instruments will be maintained and calibrated in accordance with the manufacturer's recommendations, existing Industrial Hygiene protocol, and in conformance with safety and health manuals. Calibration information, sampling and monitoring data, results from direct-reading instruments, and field observations will be recorded in the SSO's field book.

#### 2.8.5 Personnel Radiological Exposure Monitoring

Personal radiological monitoring will be conducted to quantify radiation exposure and potential for uptakes as stated in the project. This may include the use of external dosimetry, surface monitoring, and internal dosimetry methods to ensure that engineering controls, administrative controls, and work practices are effectively mitigating radiological hazards.

- **External Dosimetry**

Dosimetry requirements will be based on the radiation exposure potential during project tasks. When dosimetry is required, all personnel who enter the project area will be required to wear personal dosimetry devices, as specified in Section 2.5 and 2.8.3.

- **Radiation Control Procedures**

**A Radiological Control and Information Management System (RCIMS) will be used to track external radiation exposures to personnel via Energy Labs. Individuals are responsible for ensuring all required personal information is provided to the SSO for entry into the Energy Labs data base when dosimeters or film badges are used.**

- **Internal Dose Monitoring**

**The purpose of internal dose monitoring is to determine the effectiveness of the contamination control procedures. Internal dose monitoring will be adequate to**

**comply with 10 CFR 835 “Occupational Radiation Protection.” The requirement for whole body counts will be based on project specific tasks but should be implemented for any workers planning activities within the former process area of the mine. Whole body counts will be conducted at UC Davis and/or UNR School of Medicine.**

#### 2.8.6 Personal Protection

This section provides guidance for the selection and use of PPE to be worn for project tasks and contingencies for upgrading and downgrading PPE. Types of PPE are generally divided into two broad categories: (1) respiratory protective equipment and (2) PPE. Both of these categories are incorporated into the standard two levels of protection (Levels C and D).

The purpose of personal protective clothing and equipment is to shield or isolate individuals from the chemical, physical, radiological, and safety hazards that may be encountered during project tasks when engineering and other controls are not feasible or cannot provide adequate protection. It is important to realize that no one PPE ensemble can protect against all hazards under all conditions and that proper work practices and adequate training will serve to augment PPE to provide the greatest level of protection to workers.

The PPE policy requires that field workers wear, at a minimum, sturdy leather steel-toed boots that rise above the ankles, safety glass with side shields, and hard hats. The SSO or Safety Professional will determine where and when this requirement will be invoked for each project. Selection of the proper PPE is based on the following considerations:

- Specific conditions and nature of the tasks
- Potential contaminant routes of entry
- Physical form and chemical characteristics of hazardous materials, chemicals, or waste
- Toxicity of hazardous materials, chemicals, or waste that may be encountered
- Duration and intensity of exposure
- Compatibility of chemical(s) with PPE materials and potential for degradation
- Environmental conditions (e.g., humidity, heat, cold, rain, wind speed)
- The hazard analysis evaluation of this HASP.

PPE requirements for the two levels of PPE that may be worn during the course of the project are explained below. Applicable PPE levels will be required for conducting project tasks. Modifications to these levels will be made under the direction of the SSO in consultation

with the project health professionals, as appropriate. Such modifications are routinely employed during HAZWOPER site activities to maximize efficiency and to meet site-specific needs without compromising personnel safety and health.

#### *2.8.6.1 Level A Personal Protective Equipment*

Level A should be selected when the highest level of respiratory, skin, and eye protection is required. Level A requires the use of fully encapsulating gas-tight suits, with breathing air supply (self contained breathing apparatus (SCBA) or similar device). Encapsulation includes the SCBA.

Level A PPE includes the following:

- Pressure-demand (positive pressure) supplied air respirator, which may be either of the following:
  - Full face piece self contained breathing apparatus
  - Airline respirator with escape self contained breathing apparatus
- Fully encapsulating and vapor-tight chemical-protective suit
- Coveralls (optional)
- Long underwear (optional)

#### *2.8.6.2 Level B Personal Protective Equipment*

Level B should be selected when the highest level of respiratory protection is needed, but a lesser degree of skin protection is needed than Level A. Level B requires the use of fully encapsulating (not gas-tight) or splash suits, used with breathing air supply (self contained breathing apparatus or similar device). The air supply provides respiratory protection; the suit protects against chemical splash. Level B is used when chemicals are known not to be vapors or gases that are toxic or carcinogenic through skin contact.

Level B PPE includes the following:

- Pressure-demand (positive pressure) supplied air respirator, which may be either of the following:
  - Full face piece self contained breathing apparatus
  - Airline respirator with escape self contained breathing apparatus

- Hooded chemical-resistant clothing (includes overalls and long-sleeved jacket, coveralls and one- or two- piece chemical splash suit, or disposable chemical resistant overalls) or fully encapsulating (non-vapor-tight) suit
- Coveralls or long underwear (optional)
- Gloves (outer), chemical resistant
- Gloves (inner), chemical resistant
- Boots (outer), chemical resistant, steel toe and shank
- Boot covers (outer), chemical resistant (disposable) (optional)
- Hard hat (face shield) (optional)
- Face shield (optional)
- Two-way radio communications (intrinsically safe) (optional)

#### *2.8.6.3 Level C Personal Protective Equipment*

Level C PPE will be worn when the task site contaminants have been well-characterized indicating that personnel are protected from airborne exposures by wearing an air-purifying respirator with the appropriate cartridges, no oxygen-deficient environments exist (less than 19.5% at sea level), and that there are no conditions that pose immediate danger to life or health (IDLH). Skin protection criteria are similar to Level B. Level C requires the use of one- or two- piece splash suits, used with cartridge respirators.

Level C PPE includes the following:

- Full-face or half-mask, air purifying respirator
- Hooded chemical-resistant clothing (includes overalls and one- or two- piece chemical splash suit, or chemical resistant hood and apron, or disposable chemical resistant overalls)
- Coveralls or long underwear (optional)
- Gloves (outer), chemical resistant
- Gloves (inner), chemical resistant
- Boots (outer), chemical resistant, steel toe and shank (optional)

- Boot covers (outer), chemical resistant (disposable) (optional)
- Hard hat (optional)
- Escape mask (optional)
- Face shield (optional)
- Two-way radio communications (intrinsically safe) (optional)

The project SSO, in consultation with the project IH, will be responsible for determining when to upgrade or downgrade PPE requirements. Upgrading or downgrading of PPE based on changing site conditions or activities is a normal occurrence. Additional reasons for upgrading or downgrading are listed in the following subsections.

The level of PPE required will be upgraded for the following reasons and work will halt until PPE upgrading has been completed:

- Identification of new, unstable, or unpredictable site hazards
- Temporary loss or failure of any engineering controls
- Contaminants that present difficulty in monitoring or detecting
- Known or suspected presence of skin absorption hazards
- Identified source or potential source of respiratory hazard(s) not anticipated
- Change in the task procedure that may result in an increased contact with contaminants or meeting any of the criteria listed above.

The level of PPE will be downgraded under the following conditions:

- Elimination of hazard or completion of task(s) requiring specific PPE
- Implementation of new engineering or administrative controls that eliminate or significantly mitigate hazard
- Sampling information or monitoring data that show the contaminant levels to be stable and lower than established action limits
- Elimination of potential skin absorption or contact hazards.

#### *2.8.6.4 Level D Personal Protective Equipment*

Level D PPE will only be selected for protective clothing and not on a site with respiratory or skin absorption hazards requiring whole-body protection. Level D PPE provides no protection against airborne chemical hazards, but rather is used for protection against surface contamination and physical hazards. Level D PPE will only be allowed in areas that have been characterized as having limited contamination hazards.

Level D PPE includes the following:

- Coveralls
- Gloves (optional)
- Boots/shoes, chemical resistant, steel toe and shank
- Boots (outer), chemical resistant (disposable) (optional)
- Safety glasses or chemical splash goggles (optional)
- Hard hat (optional)
- Escape mask (optional)
- Face shield (optional)

#### *2.8.7 Air Monitoring*

The potential sources of airborne contaminants at the site are limited to the following:

- Dust generated during excavation and drilling;
- Dust generated during activities where vehicles drive on dry, dusty soils.
- Dust generated by disturbing the waste rock piles and tailings piles.
- Dust generated from strong wind conditions

Dust generated by earthwork or the operation of heavy vehicles will be kept to a minimum by the application of water or other approved dust suppressant to those soils and/or observing the site maximum speed limit of 20 mph on main roads and 5 mph elsewhere.

Dust generated by disturbing the waste piles could pose an inhalation hazard to nearby workers. Contractors will be required to address prevention of dust in their approved task-specific HASPs.

**The specific hazard due to dust inhalation and resulting alpha particle inhalation is presently being determined. Until air-monitoring data has been collected and analyzed, assume that all dust carries significant radiation hazard potential. Either leave the site during wind events or wear complete body and respiratory protection.**

**Based on recent work at the site, it appears that the best times for minimal wind conditions are from dawn until approximately 2 pm and from 7 – 8 pm onwards. Evening work can be easily conducted using portable lighting. A wind sock will be installed to facilitate the evaluation of wind conditions. In addition, engineering controls, such as water trucks and/or surfactants, will be used at all times to control dust.**

### **3 PERSONNEL TRAINING REQUIREMENTS**

#### **3.1 Pre-assignment Training/Medical Examination**

Personnel performing tasks in which there will be exposure to hazardous wastes will have received appropriate health and safety training and medical examination in accordance with 29 CFR 1910.120. The training will be required to a level consistent with their job function and responsibility. Training will consist of a minimum of 40 hours of initial instruction off-site and 3 days of on-site experience under the direct supervision of a trained, experienced supervisor. All personnel will have received a minimum of 8 additional hours of off-site (“refresher”) training each year. In addition, those Safety Supervisors shall have a minimum of 8 hours of additional specialized training in managing hazardous waste operations. Individuals with current first aid and CPR training will be identified at the safety meeting each workday. Documentation of all such training shall be submitted to the SSO before any employees will be allowed into the hazardous waste areas.

WAI/CRE/BLM personnel will conduct initial site radiation training to ensure that all workers are familiar with protocols before entering the site. As more radiation dose information becomes available, these procedures may be modified accordingly.

#### **3.2 Site Training**

The contractor’s Safety Supervisor will be responsible for the indoctrination of all contractors’ on-site personnel with regard to this HASP before any work is initiated. The initial pre-work safety meeting (indoctrination) will be conducted for all on-site personnel and will include, but will not be limited to, the following:

- Chemicals and radionuclides present at the site and the locations of chemical hazards.
- Physical health and safety hazards identified at the site.
- The selection, use, and limitations of available safety equipment.
- Work zones established at the site.
- Explanation of the buddy system.
- Emergency preparedness procedures (emergency egress routes, emergency signals, personnel rescue methods, etc.).

- Site safety requirements and HASP review.
- Locations of fire extinguishers.
- Review of any SOPs, including logging of times and locations of work performed.
- Review of team member responsibilities.
- Evacuation procedures.

### **3.3 Safety Meetings**

The contractor's Safety Supervisor will conduct daily "tailgate" crew safety meetings that will be mandatory for all on-site personnel. The meetings will serve as a refresher for existing equipment and protocols and will examine new site conditions as they are encountered. Additional safety meetings will be held on an as-required basis. Opportunity will be provided for employees to voice health and safety-related concerns.

Should any unforeseen or site-peculiar safety-related factor, hazard, or condition become evident during the performance of work at this site, the Safety Supervisor will take prudent action to establish and maintain safe working conditions and to safeguard employees, the public, and the environment.

All worker data will be entered into a logbook kept by the SSO. The log book will contain:

- Worker name
- Location(s) of worker each day
- Number of hours spent at each location
- Notes containing any unusual occurrences or observations

## 4 SITE CONTROL MEASURES

### 4.1 Site Access and Security

Both radiological and non-radiological hazards (including industrial safety hazards) will be evaluated when establishing the initial work zone size, configuration, and location. Figure 4-1 illustrates an example of work zones that may be established at the project task site. Common barriers may be used to delineate both radiological and non-radiological work-zone postings, depending on the nature and extent of contamination. If common barriers are used, they will be delineated and posted in accordance with both sets of requirements (29 CFR 1910.120 and 10 CFR 835 using appropriately colored rope and postings. These zones may change in size and location as project tasks evolve, based on project monitoring data, and as wind direction changes. Additionally, entrance and egress points will change based on these same factors. Work zones may include:

- Support Zone (SZ) (controlled area)
- Contamination Reduction Zone (CRZ),
- Radiological Buffer Area (RBA), including a contamination reduction corridor (CRC) if radiological hazards are present
- Exclusion Zone (EZ),
  - Radiation Area (RA),
  - High Radiation Area (HRA),
  - Contamination Area (CA),
  - High Contamination Area (HCA), or
  - Very High Radiation Area (VHRA).

Visitors may be admitted into work areas provided they (1) are on official business; (2) have received site-specific training or orientation by the BLM or designee; (3) have met all the site-specific training requirements for the area they have a demonstrated need to access (including PPE training); and (4) wear all required PPE. Visitors who do not meet the above criteria will not be permitted into work areas and will need permission from the BLM prior to being allowed on site.

The exclusion zone (EZ) will be large enough to encompass the primary task area for sampling and to allow equipment and personnel to move about freely and conduct necessary tasks. The minimum number of personnel required to safely perform project tasks will be allowed into the EZ. If the EZ will be relocated to another site or reconfigured, it will be delineated in a configuration large enough to prevent non-field team personnel in the support zone (SZ) from being exposed to potential safety and health hazards. The EZ shape and size will be based on the tasks being conducted, existing structures and facilities, and potential for impact to adjacent areas from project tasks or contaminants.

The EZ is a controlled access zone at all times. The EZ will be controlled physically by fencing and/or other engineering controls, and access will only be allowed under permission of the SSO. An entry and exit point will be established at the periphery of the EZ and the contamination reduction corridor (CRC) to regulate the flow of personnel and equipment. The EZ boundary will be delineated with rope or printed hazard ribbon and posted with signs.

Factors that will be considered when establishing the EZ boundary include: (1) tasks being conducted, (2) air monitoring data (when available), (3) radiological contamination data, (4) radiation fields, (5) equipment in use, (6) the physical area necessary to conduct site operations, and (7) the potential for contaminants to be blown from the area. The boundary may be expanded or contracted as these factors change or additional monitoring information becomes available. All personnel who enter the EZ will wear the appropriate level of PPE for the hazards present and have required training as listed in previous sections of this HASP, respectively.

The contamination reduction zone (CRZ) and the contamination reduction corridor (CRC) are transition areas surrounding the EZ and are located between the EZ and SZ. The CRC may not be formally delineated, but will be designated by the travel path from the established CRZ-controlled entry and exit point and the EZ entry and exit point. The CRZ and CRC will serve to buffer the SZ from potentially contaminated EZ areas. The CRZ and CRC may serve as staging areas for equipment and temporary rest areas for personnel.

The support zone (SZ) will be considered a "clean" area. The location of the SZ will be in a prevailing upwind direction from the EZ (where possible) and readily accessible from the nearest road. The SZ is a designated area or building outside the CRZ and does not have to be delineated. Support trailer, vehicle parking, additional emergency equipment, extra PPE, and stored monitoring and sampling equipment may be located in the SZ. Visitors who do not have appropriate training to enter other project areas will be restricted to this zone.

The SSO will maintain site security and control. The requirements for site security and control will include a personnel check-in and check-out log system and posted entrances and boundaries of regulated areas.

The site boundaries are well-marked or fenced in all areas.

## **4.2 Site Communication**

Communications using radios (shoulder-mounted), hand signals, signs, and other means will be established. All workers will utilize the “buddy system,” which demands that persons work in pairs at all times. The key elements of the buddy system (to be enforced by the SSO) include:

- Workers must always remain in clear view of each other so that hand signals can be easily seen.
- Workers must remain in radio contact.
- Workers must check radio performance each day.
- A consistent set of hand signals will be developed and reviewed at safety meetings.

Buddy system training will be conducted by the SSO with each team at the safety meetings. Emergency communications should be prearranged in case of radio failure, necessity for evacuation of the site, or other reasons.

Entrance and exit locations will be designated and emergency escape routes delineated. Warning signals for site evacuation will be established.

## **4.3 Housekeeping**

Proper housekeeping is the responsibility of all site personnel. All areas of the site must be kept neat and orderly and free of all obstructions to minimize the potential for accidents as well as to ensure safe egress from the site in case of an emergency evacuation.

## **4.4 Dust Control**

Air monitoring data is not currently available for the site. Until air data becomes available, dust control measures as described below should be implemented.

Dust control measures will be implemented by the contractor during periods of high usage of heavy equipment or vehicular traffic or work within radiation hazard areas. Engineering controls will be necessary within the radiation hazard zones. These will be determined when air monitoring data has been analyzed. In non-radiation hazard areas, dust control measures will generally consist of water applications that will be applied as necessary to prevent dust emissions and/or reducing vehicle speed on site to 20 mph on main roads and 5 mph elsewhere. Water, when used for dust control measures, will be applied in a manner that will

prevent ponding. Other engineering controls may be necessary in the radiation hazard zones, and must be approved by BLM or their representatives.

## **5 EMERGENCY RESPONSE/CONTINGENCY PLAN**

### **5.1 Pre-Emergency planning**

During indoctrination training, all employees will be notified of the provisions of this emergency response plan, the communications systems, and evacuation routes. The plan will be reviewed and revised if necessary by the SSO in order to ensure that it is adequate and compatible with general site conditions. A copy of this HASP will also be sent to the local fire department and emergency responders. The SSO will meet with representatives from these organizations to ensure understanding of the plan. The local emergency responders will be updated quarterly by the SSO.

### **5.2 Lines of Authority**

The SSO or other person designated by the SSO has primary responsibility for responding to and ensuring correction of emergency situations. This includes taking measures to ensure the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the site, and notification of the appropriate authorities. Responsibilities also include ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed.

### **5.3 Nearest Medical Assistance**

The nearest medical facility is Yerington Nevada Memorial Hospital, which is approximately 2 miles east of the Mine. A map showing the route to the Hospital is included in Appendix B. In the event of a serious medical emergency, the hospital will dispatch a medical evacuation helicopter to the site.

### **5.4 Emergency Contingency Plans**

Contingency plans for a variety of situations are presented in the subsections that follow. These plans are structured to include specific situations that may occur during operations and also incorporate the contingency measures of 40 CFR 265.52.

#### **5.4.1 Contingency Plan for Physical Injury to Personnel**

The contingency plan for physical injuries to personnel will consist of the following:

- For minor injuries, routine first aid procedures will be used. Each contractor will have an approved first aid kit on-site.
- First aid stations and back-up first aid equipment will be kept in the contractor's staging area, away from contaminated areas of the site.
- Portable, disposable first-aid equipment will also be located near the working areas but outside the exclusion zones. First-aid equipment suspected of contamination will be disposed of.
- For serious injuries, a medical evacuation helicopter may be dispatched to the appropriate hospital. First aid responders will get information about the nature of the injury from the victim if the victim is conscious. The helicopter medical evacuation personnel will contact the hospital. After proper consultation with the hospital, the injured person(s) will be transported to the hospital.
- If the victim is unconscious, the first aid responders will check for vital signs.
- In the event of cessation of breathing or cessation of heartbeat, appropriately qualified first aid responders will administer rescue breathing or CPR, respectively.
- In the event of bleeding, broken bones, shock, burns, heat exhaustion, heat stroke, seizure, insect sting, etc., the first aid responders will use the Red Cross-approved measures for treatment.
- BLM and the appropriate regulatory agencies will be immediately advised of any accident involving death, bodily injury, or substantial property damage. All accidents, injuries, and near-misses will be immediately reported to BLM.

#### 5.4.2 Radiation Exposure

In the event of suspected radiation exposure, the worker will first be decontaminated and then follow emergency procedure to the nearest hospital. Decontamination water/materials will be disposed of as noted earlier. Worker radiation exposure will be evaluated by a physician trained in nuclear medicine utilizing appropriate clinical techniques. It is expected that evaluations will include comparison of whole body radiation counts pre- and post-site exposure as well as analysis of cumulative radiation exposure measured by the film badges.

#### 5.4.3 Fire or Explosion

Fire prevention and response will be reviewed during contractor safety briefings. Fire prevention measures to be implemented include the following:

- Smoking will be restricted to designated areas, away from flammable materials.
- Hot work permits will be required and issued on a daily basis, as warranted by site activities.
- Open burning of any material (e.g., tree stumps, discarded lumber, or any other waste materials) is prohibited.
- Daily housekeeping inspections will be conducted by the contractor's Safety Supervisor. These inspections will look for material storage or handling practices that could lead to a fire.
- All areas of the site will be maintained daily to remain free from an accumulation of flammable materials (e.g., soaked rags or discarded cartons). Flammable materials will be stored properly, away from potential ignition sources.

Portable fire extinguishers will be provided at fuel storage tanks, on mobile equipment as required by regulation, and at any other site locations where flammable materials are located.

In the event of a fire or explosion, the local fire department (911) will be immediately summoned following head count and evacuation.

Site personnel may:

- Use fire-fighting equipment available on-site to control or extinguish a small, localized fire.
- Remove or isolate flammable or other hazardous materials that may contribute to the fire.

#### 5.4.4 Spills and Leaks

Fuel may be stored or transported on-site for the purpose of refueling construction vehicles. These fuel trucks or storage tanks would typically contain less than 1,000 gallons of fuel per compartment. Other liquids that could be released by spills or leaks include lubricating and hydraulic oils; and liquids associated with construction, such as paints, coatings, adhesives, solvents, and cleaning chemicals. These liquids would be stored in containers ranging from 55-gallon drums to less than 1 gallon in size.

##### 5.4.4.1 Release Prevention

Each contractor is responsible for preventing environmental pollution and for environmental restoration resulting from releases, including the removal and proper disposal of contaminated soils.

Each contractor's HASP will identify the name and estimated quantity of each chemical substance to be brought on-site, and will include a MSDS for each. Their HASP will also list the containment and cleanup equipment to be provided and maintained on-site by the contractor to respond to a release of these chemical substances.

Daily housekeeping inspections will be conducted by the contractor's Safety Supervisor. These inspections will look for material storage or handling practices that could lead to a release. Unacceptable practices will be promptly corrected.

#### *5.4.4.2 Response to a Release*

In the event of a release, site personnel will:

- Immediately inform their supervisor and SSO. The SSO will then immediately inform the BLM.
- Locate the source of the spillage, assess the situation, and stop the flow if it is safe to do so.
- Contain the release from migrating, using the contractor's spill containment supplies stored on-site.
- Take immediate actions to remove the spilled liquids and materials contaminated by the spill (e.g., soils). This may involve the use of a qualified spill cleanup contractor.
- Properly dispose of contaminated materials.
- Take corrective actions to prevent similar occurrences.

### **5.5 Emergency Response**

In the event of an emergency associated with the project, the SSO or a designated alternate will, without delay:

- Ensure the safety of all personnel at the site.
- Account for all site personnel.
- Summon the appropriate emergency response services (Fire Department, hospital, etc.).
- Assess the situation and, if safe, take diligent action to remove or otherwise minimize the cause of the emergency.

- Alert the proper regulatory agencies.
- Institute whatever measures might be necessary to prevent any repetition of the conditions or actions leading to, or resulting in, the emergency.

## **5.6 Evacuation Routes/Procedures**

In the event of an emergency that necessitates an evacuation of the site, or if notified by the SSO of an emergency requiring evacuation, contractors will evacuate the site in accordance with directions provided during the indoctrination training. The site evacuation routes will be posted in the staging area so that all personnel will be familiar with the evacuation route for the area in which they are working.

When an evacuation alarm (continuous air-horn) has been sounded, it has been deemed to be dangerous enough to warrant evacuation. These conditions could be:

- Weather - lightning, tornado, extreme wind conditions.
- Flooding of site (e.g., work in a creek bed).
- Fire, explosion.
- Earthquake.

At the evacuation site, the SSO and an assistant will perform independent head counts to ensure that all workers are accounted for.

## **5.7 Emergency Contact/Notification System**

A list of emergency contact phone numbers is posted in the staging area. This list includes local emergency responders and medical facilities, appropriate regulatory officials, and those providing technical information such as the Poison Control Center. Once site work has begun, the SSO will supplement the list in Appendix C with the locations of first aid kits, fire extinguishers, and other emergency equipment on-site, as well as the names of persons trained in first aid and CPR. This list will be updated, as necessary. Accompanying this list will be a copy of the map and directions to Sierra Nevada Memorial Hospital (see Appendix B).

## **5.8 Emergency Equipment**

The following is a list of emergency equipment that will be available on-site:

- First aid kit including snake bite kit.

- Decontamination station.
- Fire extinguishers.
- Site telephone (SSO).
- Eyewash (15-minute).
- Air horn (SSO).

## **5.9 Accident/Incident Reporting**

In the event that an accident or some other significant incident (including a “near-miss” incident involving no injuries) occurs during the project, a written report will be completed within 48 hours by the Contractor. The report will include the following:

- Name, organization, telephone number, and location.
- Name and title of person reporting the accident/incident.
- Date and time of accident/incident.
- Location of accident/incident.
- Brief summary of accident/incident giving pertinent details, including type of operation ongoing at time of incident.
- Cause of accident/incident (if known).
- Casualties.
- Estimated property damage, if applicable.
- Nature of damage and effect on project schedule.
- Action taken to ensure safety and security.
- Other damages or injuries sustained.

In addition, for each injury, an acceptable OSHA 101 “Supplementary Record of Occupational Injuries and Illnesses” form shall be completed and provided to the SSO within 48 hours.

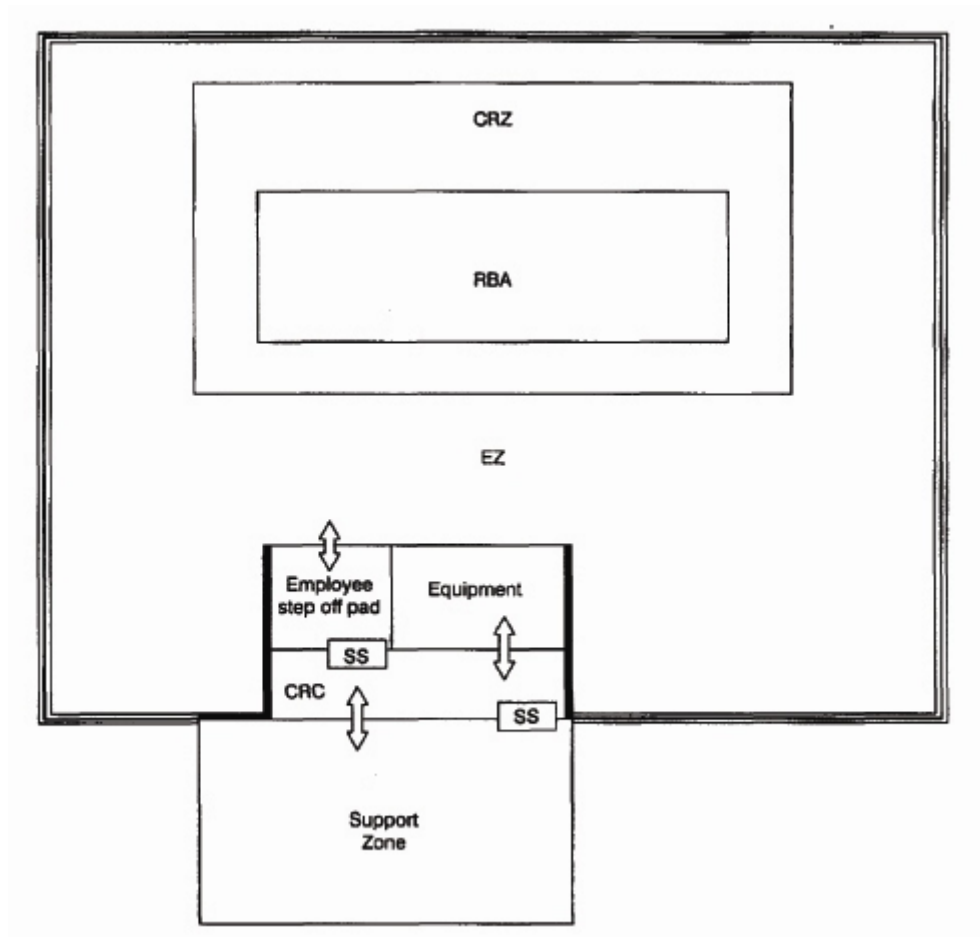
## **6 SITE DOCUMENTATION PROCEDURES**

### **6.1 Safety Logbook**

A Safety Logbook will be maintained by the Contractor. This information will be in a notebook and will contain, at a minimum, the following information:

- Date.
- Training conducted.
- Areas checked.
- Employees in particular areas.
- Protective clothing being worn by workers.
- Job-related injuries or accidents.
- Daily log of work time on site and location(s) worked.

## **7 FIGURES**



**Figure 4-1. Example of work zone layout.**

## **8 TABLES**

**Table 1-1.** *Highlights of the Injury and Illness Prevention Program Major Requirements.*  
*Source: 8 CCR 3203.*

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1. Identify person or persons with authority and responsibility for implementing the program.
  2. Include a system for ensuring that employees comply with safe and healthy work practices.
  3. Include a system for communication with employees in a form readily understandable by all affected employees on matters relating to occupational safety and health, including a provision designed to encourage employees to inform the employer of hazards at the worksite without fear of reprisal.
  4. Include procedures for identifying and evaluating workplace hazards, including scheduled periodic inspections to identify unsafe conditions and work practices.
  5. Include a procedure to investigate occupational injury or occupational illness.
  6. Include methods and/or procedures for correction of unsafe or unhealthy conditions, work practices, and work proceedings in a timely manner based on the severity of the hazard.
  7. Provide instruction and training to employees.
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**Table 2-1.** *List of Potential Site Health and Safety Hazards.*

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(Hazards Common to all Site Work Denoted by *)	
<b><u>Physical/Construction/Physiochemical Hazards<sup>a</sup></u></b>	
Confined Space Entry – deep excavations and abandoned tunnels. (Section 2.2.1)	
Drill rigs. (Section 2.2.3)	
* Eye hazards - flying objects or splashing (see Table 2-2, PPE)	
Fire/explosion (Section 2.2.3)	
Flood potential (i.e., flash floods in creek bed) (Section 5.4.3)	
Dusts (Sections 2.3 and 4.4)	
* Heat Stress (Section 2.2.4)	
Illumination (Section 2.2.5)	
* Inclement weather - rain, electrical storms, snow, and fog (Section 2.2.6)	
* Manual lifting and handling of heavy objects (Appendix A)	
* Noise (See Table 2-2)	
Overhead hazards (See Table 2-2)	
* Remote work areas (Section 2.2.7)	
* Rough terrain (e.g., steep slopes, landslide potential) see Section 2.2.8	
* Slip/trip/fall (see Section 2.2.8)	
Traffic in work area (Section 2.2.9)	
Utilities (i.e., overhead and buried)	
Working near water Section 2.2.10	
<b><u>Chemical Hazards</u></b>	
AMD (seeps, waste rock, tailings)	
* Chemical substances brought to the site by contractors (e.g., gasoline, oils, lubricants, solvents, cleaning chemicals, adhesives, paints, and coatings)	
Waste rock piles and tailings ponds and berms	
Hematite Material	
<b><u>Biological Hazards</u></b>	
* Animal and bird droppings	
* Bites, stings, injuries from insects, snakes, or wild animals (including bears and mountain lions)	
<b><u>Radiation Hazards</u></b>	
* Radionuclides: Uranium, Thorium, Radium, Radon from enriched copper ore processing in surface water, groundwater, soils, and rock/tailings dumps.	

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*Note: Many of these listed hazards correspond to headings in the OSHA regulations*

**Table 2-2.** *Minimum Required Standards for Personal Protection.*

<b>Hazard</b>	<b>Minimum Required Protection</b>
Foot Injury Hazard	Wear approved safety shoes or boots meeting the criteria established by OSHA (29 CFR 1910 and 1926).
Eye Injury Hazard	Wear approved safety glasses or goggles meeting the criteria in ANSI Standard Z87. At a minimum, must be approved safety glasses with side shields. Contact lenses shall not be worn as eye protection, and shall not be worn in hazardous chemical environments. APPROVED SAFETY GLASSES/GOGGLES SHALL BE WORN AT ALL TIMES IN ALL WORK AREAS ON-SITE.
Head Injury (overhead) Hazards	Wear an approved hard hat meeting the criteria in ANSI Standard Z89.1. Inspect hard hats regularly for signs of damage or impaired protection, including the following items: <ul style="list-style-type: none"> <li>• Cracks or scratches.</li> <li>• Suspension is properly installed and free from visible defects.</li> </ul> APPROVED HARD HATS SHALL BE WORN AT ALL TIMES IN ALL WORK AREAS ON-SITE (UNLESS THE SSO PROVIDES APPROVAL IN WRITING THAT HARD HATS ARE NOT REQUIRED FOR A SPECIFIC ACTIVITY OR WORK AREA).
Noise	Wear approved ear plugs or ear muffs when noise levels are above 85 decibels (dB). Rule-of-thumb: if two people standing at arms length distance apart need to raise their voice to be clearly heard, ear protection is required. APPROVED EAR PLUGS OR EAR MUFFS SHALL BE WORN ON-SITE WHEN NOISE LEVELS ARE ABOVE 85 dB.
Unauthorized Person Entering Active Work Areas	Personnel who are not contractor employees shall not enter active work areas without a specific job-related purpose. When entering work areas, personnel shall immediately contact the contractor's Safety Supervisor (or Supervisor if the Safety Supervisor is not present) to identify their presence and purpose, and to ask where to stand and how to protect themselves from the hazards in that area. Follow the direction of the contractor's Safety Supervisor or Supervisor - or immediately leave the work area.
Hot Work and Confined Spaces Entry	No personnel shall perform or participate in either Hot Work or Confined Space Entry before an approved permit is issued in writing by either the Contractor's Safety Supervisor or the SSO. All personnel participating shall read, understand, and sign the permit form before beginning the activity.
Injuries and Exposure to Bloodborne Pathogens	Each contractor shall have an approved first aid kit on-site. The kit shall include PPE necessary for compliance with the OSHA Occupational Exposure to Bloodborne Pathogens Standard (29 CFR 1910.1030) (These kits are available from industrial medical suppliers).

**Table 2-3.** *Personal Protection Procedures for Working with Chemical Hazards.*

Chemical Hazard	Minimum PPE	Decontamination Procedures*
AMD, Seeps	<ul style="list-style-type: none"> <li>• Dedicated work clothes.</li> <li>• Safety glasses or chemical splash goggles.</li> <li>• Faceshield and hard hat (only when splash potential is high).</li> <li>• Gloves (acceptable types include neoprene, viton, latex rubber, nitrite, butyl, and polyvinyl chloride (PVC)). Cloth or leather gloves are not acceptable.</li> <li>• An approved 15-minute eyewash station MUST be present at the work location.</li> <li>• Waterproof rubber boots or boot covers (when standing in liquid).</li> <li>• Body protection (e.g., waterproof rainwear, apron, or Tyvek suit) may be warranted when splash potential is high.</li> <li>• Coast Guard approved life jackets when working in or near AMD pit.</li> </ul>	<ul style="list-style-type: none"> <li>• Remove any wet clothing.</li> <li>• If AMD has contacted the skin, rinse thoroughly with a solution of baking soda in water.</li> <li>• Wash hands with soap and water.</li> <li>• Launder work clothing separate from household laundry.</li> </ul>
Waste Rock Piles/Tailings/Soil w/Radio-Nuclides	<ul style="list-style-type: none"> <li>• Dedicated work clothes.</li> <li>• Orange Safety Vest</li> <li>• Safety glasses or chemical splash goggles.</li> <li>• Work gloves.</li> <li>• Respiratory protection to be determined by the SSO. Do not disturb waste piles unless the SSO has approved the Contractor dust control measure.</li> <li>• Film badges required and dosimeter required at all times</li> </ul>	<ul style="list-style-type: none"> <li>• Wash hands with soap and water and Radiac.</li> <li>• Launder work clothing separate from household laundry.</li> <li>• Clear body and clothing prior to leaving and entering site</li> <li>• Wash vehicles on-site</li> </ul>

\*Disposable protective equipment is to be placed in plastic bags and disposed of properly. Personnel working with chemical hazards shall shower as soon as is practical after leaving the site.